

**What is claimed is:**

1. An electron gun apparatus for a cathode ray tube, comprising:

a single cathode emitting an electron beam, the electron beam being scanned in a scanning direction;

a first electrode being mounted adjacent to said cathode, said first electrode forming a first plurality of beam passage apertures aligned in an alignment direction substantially perpendicular to the scanning direction;

a second electrode being mounted adjacent to said first electrode, said first electrode being disposed between said second electrode and said cathode, said cathode and first and second electrodes forming a triode portion, said second electrode forming a second plurality of beam passage apertures aligned in the alignment direction, the electron beam penetrating at least one of the first plurality of beam passage apertures and at least one of the second plurality of beam passage apertures;

a plurality of focusing electrodes being mounted adjacent to each other, said focusing electrodes including one focusing electrode mounted adjacent to said second electrode and including a last focusing electrode, the one focusing electrode being disposed between said second electrode and the last focusing electrode;

an anode electrode being mounted adjacent to the last focusing electrode; and

at least one support providing support to said cathode and said electrodes.

1           2.     The apparatus of claim 1, each of the first and second plurality of beam passage  
2     apertures having a diameter  $D$  being less than or equal to 0.3 millimeters and being greater than or  
3     equal to 0.1 millimeters, the first plurality of beam passage apertures having a highest aperture above  
4     all other ones of the first plurality of beam passage apertures and having a lowest aperture below all  
5     other ones of the first plurality of beam passage apertures when viewed along the alignment  
6     direction, the highest aperture having a top edge and the lowest aperture having a bottom edge when  
7     viewed along the alignment direction, the length  $L$  from the top edge of the highest aperture to the  
8     bottom edge of the lowest aperture being less than or equal to  $8D$  and being greater than or equal to  
9      $2D$ .

1           3.     The apparatus of claim 1, said cathode emitting the electron beam in a tube-axis  
2     direction substantially perpendicular to the scanning direction, the alignment direction being  
3     substantially perpendicular to the scanning and tube-axis directions.

1           4.     The apparatus of claim 3, each one of the first plurality of beam passage apertures  
2     having a center aligned with a center of a respective one of the second plurality of beam passage  
3     apertures as viewed in a direction substantially parallel to the tube-axis direction.

1           5.     The apparatus of claim 3, every one of the first plurality of beam passage apertures  
2     and every one of the second plurality of beam passage apertures having a same size and a same  
3     shape.

1           6.       The apparatus of claim 5, each one of the first plurality of beam passage apertures  
2       having a center aligned with a center of a respective one of the second plurality of beam passage  
3       apertures as viewed in a direction substantially parallel to the tube-axis direction.

1           7.       The apparatus of claim 6, each of the first and second plurality of beam passage  
2       apertures having a diameter  $D$  being less than or equal to 0.3 millimeters and being greater than or  
3       equal to 0.1 millimeters, the first plurality of beam passage apertures having a highest aperture above  
4       all other ones of the first plurality of beam passage apertures and having a lowest aperture below all  
5       other ones of the first plurality of beam passage apertures when viewed along the alignment  
6       direction, the highest aperture having a top edge and the lowest aperture having a bottom edge when  
7       viewed along the alignment direction, the length  $L$  from the top edge of the highest aperture to the  
8       bottom edge of the lowest aperture being less than or equal to  $8D$  and being greater than or equal to  
9        $2D$ .

1           8.       The apparatus of claim 3, each one of the first plurality of beam passage apertures  
2       being formed to have a position corresponding to a respective one of the second plurality of beam  
3       passage apertures, the first plurality of beam passage apertures including at least a first beam passage  
4       aperture, the second plurality of beam passage apertures including at least a second beam passage  
5       aperture having a position at least approximately corresponding to a position of the first beam  
6       passage aperture, the first beam passage aperture being adjacent to the second beam passage aperture,

7 portions of the electron beam passing through both the first beam passage aperture and the second  
8 beam passage aperture, the first beam passage aperture having a center not aligned with a center of  
9 the second beam passage aperture as viewed in a direction substantially parallel to the tube-axis  
10 direction.

1 9. The apparatus of claim 8, the center of the first beam passage aperture being spaced  
2 apart from the center of the second beam passage aperture in the alignment direction.

10 10. The apparatus of claim 9, the second beam passage aperture being larger than the first  
11 beam passage aperture.

12 11. The apparatus of claim 3, said second electrode including a first sub-electrode  
13 mounted adjacent to said first electrode and including a second sub-electrode mounted between said  
14 first sub-electrode and said plurality of focusing electrodes, said first sub-electrode forming a third  
15 plurality of beam passage apertures, said second sub-electrode forming a fourth plurality of beam  
16 passage apertures, each one of the third plurality of beam passage apertures having a center aligned  
17 with a center of a respective one of the fourth plurality of beam passage apertures in a direction  
18 substantially parallel to the tube-axis direction.

1 12. The apparatus of claim 11, every one of the first plurality of beam passage apertures  
2 and every one of the third plurality of beam passage apertures and every one of the fourth plurality

of beam passage apertures having a same size and a same shape.

13. The apparatus of claim 12, each one of the first plurality of beam passage apertures having a center aligned with a center of a respective one of the third plurality of beam passage apertures and with a center of a respective one of the fourth plurality of beam passage apertures in a direction substantially parallel to the tube-axis direction.

14. The apparatus of claim 11, each of the first, third, and fourth plurality of beam passage apertures having a diameter  $D$  being less than or equal to 0.3 millimeters and being greater than or equal to 0.1 millimeters, the third plurality of beam passage apertures having a highest aperture above all other ones of the first plurality of beam passage apertures and having a lowest aperture below all other ones of the first plurality of beam passage apertures when viewed along the alignment direction, the highest aperture having a top edge and the lowest aperture having a bottom edge when viewed along the alignment direction, the length  $L$  from the top edge of the highest aperture to the bottom edge of the lowest aperture being less than or equal to  $8D$  and being greater than or equal to  $2D$ .

15. The apparatus of claim 11, each one of the third plurality of beam passage apertures being formed to have a position corresponding to a respective one of the fourth plurality of beam passage apertures, the third plurality of beam passage apertures including at least a first beam passage aperture, the fourth plurality of beam passage apertures including at least a second beam

5 passage aperture having a position at least approximately corresponding to a position of the first  
6 beam passage aperture, the first beam passage aperture being adjacent to the second beam passage  
7 aperture, portions of the electron beam passing through both the first beam passage aperture and the  
8 second beam passage aperture, the first beam passage aperture having a center not aligned with a  
9 center of the second beam passage aperture as viewed in a direction substantially parallel to the tube-  
10 axis direction.

16. The apparatus of claim 15, the center of the first beam passage aperture being spaced  
apart from the center of the second beam passage aperture in the alignment direction.

17. The apparatus of claim 16, the second beam passage aperture being larger than the  
first beam passage aperture.

18. An apparatus for a cathode ray tube, comprising:  
a cathode emitting an electron beam toward a screen, the electron beam being scanned in a  
scanning direction;  
a first electrode being mounted adjacent to said cathode, said first electrode forming at least  
three beam passage apertures aligned in an alignment direction perpendicular to the scanning  
direction;  
a second electrode being mounted adjacent to said first electrode, said first electrode being  
disposed between said second electrode and said cathode, said second electrode forming at least

three beam passage apertures aligned in the alignment direction, each one of the beam passage apertures of said first electrode being formed to have a position corresponding to a respective one of the beam passage apertures of said second electrode;

three focusing electrodes being mounted adjacent to each other, said focusing electrodes including a first focusing electrode mounted adjacent to said second electrode and including a last focusing electrode, the first focusing electrode being disposed between said second electrode and the last focusing electrode;

an anode electrode being mounted adjacent to the last focusing electrode, the electron beam being emitted through at least one of the beam passage apertures of said first electrode, at least one of the beam passage apertures of said second electrode, said focusing electrodes, and said anode electrode and to the screen; and

at least one support providing support to said cathode and said electrodes.

19. An apparatus for a cathode ray tube, comprising:

a single cathode emitting an electron beam, the electron beam being scanned in a scanning direction;

a first electrode being mounted adjacent to said cathode, said first electrode forming a plurality of beam passage apertures aligned in an alignment direction substantially perpendicular to the scanning direction;

a second electrode being mounted adjacent to said first electrode, said first electrode being disposed between said second electrode and said cathode, said cathode and first and second

9 electrodes forming a triode portion, said second electrode forming a second plurality of beam  
10 passage apertures aligned in the alignment direction, each one of the first plurality of beam passage  
11 apertures being formed to have a position corresponding to a respective one of the second plurality  
12 of beam passage apertures;

13 a plurality of focusing electrodes being mounted adjacent to each other, said focusing  
14 electrodes including a first focusing electrode mounted adjacent to said second electrode and  
15 including a last focusing electrode, the first focusing electrode being disposed between said second  
16 electrode and the last focusing electrode;

17 an anode electrode being mounted adjacent to the last focusing electrode, the electron beam  
18 penetrating at least one of the first plurality of beam passage apertures, at least one of the second  
19 plurality of beam passage apertures, said focusing electrodes, and said anode electrode; and

20 a support supporting said cathode and said electrodes;

21 said cathode emitting the electron beam in a tube-axis direction substantially perpendicular  
22 to the scanning direction, the alignment direction being substantially perpendicular to the scanning  
23 and tube-axis directions;

24 at least one of the first plurality of beam passage apertures having a center aligned with a  
25 center of a corresponding one of the second plurality of beam passage apertures as viewed in a  
26 direction substantially parallel to the tube-axis direction;

27 at least one of the first plurality of beam passage apertures having a center not aligned with  
28 a center of a corresponding one of the second plurality of beam passage apertures as viewed in a  
29 direction substantially parallel to the tube-axis direction.



1           20.    The apparatus of claim 19, the first and second plurality of apertures having a shape  
2    selected from among circular and rectangular as viewed in a direction substantially parallel to the  
3    tube-axis direction, at least one of the second plurality of beam passage apertures being larger than  
4    at least one of the first plurality of beam passage apertures.